

Application No. 10/696,788
Amendment Dated 9/2/2008
Reply to Office Action of 05/30/2008

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Listing of Claims:

1-20 (canceled)

21. (previously presented) A method of guiding a vehicle, the method comprising:
 establishing elevation data and corresponding location data for a work area divided into cells;
 determining location data, including a particular location of a vehicle, within the work area;
 estimating at least one of roll data and pitch data corresponding to the particular location, the roll data associated with a corresponding lateral slope, the pitch data associated with a corresponding longitudinal slope generally perpendicular to the lateral slope, wherein each of the roll data and pitch data are separately estimated using i) a maximum slope of ground with respect to a reference point for each cell traversed by the vehicle corresponding to the particular location, and the maximum slope having a non-zero longitudinal slope component and a non-zero lateral slope component, and ii) an aspect angle between a direction of the maximum slope and an axis with which a direction of travel is coincident;
 guiding the vehicle steering in a direction of travel with compensation data based upon at least one of the estimated roll data and the pitch data such that an actual path of the vehicle follows a target path.
22. (previously presented) The method according to claim 21 wherein the roll data comprises a roll angle and wherein the pitch data comprises a pitch angle.
23. (previously presented) The method according to claim 21 wherein each cell is associated with a corresponding elevation data and respective location data.
24. (previously presented) The method according to claim 21 further comprising establishing respective slope data and aspect data associated with the location data, the slope data indicating a change in elevation of terrain in the work area and the aspect data indicating the direction of slope.

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25. (previously presented) The method according to claim 21 wherein the target path comprises a substantially linear or arc path segment.

26. (previously presented) The method according to claim 21 wherein the guidance comprises generating a steering compensation data to compensate for changes in the roll data and pitch data between an uncorrected vehicular path and the target path.

27. (previously presented) The method according to claim 21 wherein the estimating comprises estimating the pitch data based on one or more of the following: location data, elevation data, a current position of the vehicle, an expected position of the vehicle, vehicle speed, vehicle heading, vehicular velocity, and a path plan.

28. (previously presented) The method according to claim 21 wherein the estimating comprises estimating the pitch data consistent with the following equation:

$\theta(\text{Pitch angle}) = \Theta_x = \arcsin(\sin \Theta \sin \Psi)$, where Ψ is the aspect, Θ is the slope, and Θ_x is the longitudinal slope angle.

29. (previously presented) The method according to claim 21 wherein the estimating comprises estimating the roll data based on one of more of the following: location data, elevation data, a current position of the vehicle, an expected position of the vehicle, vehicle speed, vehicle heading, vehicular velocity, and a path plan.

30. (previously presented) The method according to claim 21 wherein the estimating comprises estimating the roll data consistent with the following equation:

$\Phi(\text{Roll angle}) = \Theta_y = \arcsin(\sin \Theta \cos \Psi)$, where Ψ is the aspect, Θ is the slope, and Θ_y is the lateral slope.

31 - 40. (Canceled)

41. (previously presented) The method according to claim 21 wherein the aspect represents a radial direction of maximum slope.

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42. (previously presented) The method according to claim 28 wherein the equation is supplemented by at least one of a static force balance equation and a dynamic force equation considering one or more of the following variables: vehicle geometry, vehicle size, tire geometry, vehicle weight and load, vehicle wheelbase and spacing, forces acting on the tires of the vehicle, and velocities and accelerations of the vehicle and their components.

43. (previously presented). The method according to claim 30 wherein the foregoing equation is supplemented by at least one of a static force balance equation and a dynamic force equation considering one or more the following variables: vehicle geometry, vehicle size, tire geometry, vehicle weight and load, vehicle wheelbase and spacing, forces acting on the tires of the vehicle, and velocities and accelerations of the vehicle and their components.

44. (previously presented) The method of claim 21 wherein a size of each of the cells is less than or equal to a length of the vehicle.

45. (previously presented) The method of claim 21 wherein the particular location of the vehicle is at least one of a current location of the vehicle, a planned location of the vehicle, and a path plan interconnecting the current location and the planned location of the vehicle.